



CITY OF PEMBROKE PINES

**Recycling and
Sustainable Energy
Recovery Solution**

WHITE PAPER

APRIL 20, 2026

Recycling and Sustainable Energy Recovery Solution

EXECUTIVE SUMMARY

The City of Pembroke Pines is at a pivotal point in determining the future of its solid waste management system. Increasing disposal costs, evolving environmental regulations, and uncertainty regarding long-term regional infrastructure require the City to carefully evaluate multiple strategies to ensure a reliable, cost-effective, and sustainable solution for its residents.

At the regional level, Broward County has advanced the formation of a **Solid Waste Authority (SWA)**, which proposes a countywide system focused on waste diversion, recycling, and program coordination. As part of its Master Plan development, the SWA evaluated five (5) potential system scenarios and is recommending Scenario A, which is designed to achieve an estimated 62% diversion rate through a combination of recycling, organics processing, and waste reduction initiatives.

All five (5) scenarios evaluated by the SWA include the development of significant new infrastructure, including three (3) transfer stations, two (2) construction and demolition (C&D) recovery facilities, eight (8) permanent drop-off centers, organics processing operations including two (2) mulch/colorizing facilities and **one (1) biochar pyrolysis**, and the need for a long-term disposal solution, **including a 640 acre landfill**. In addition, Scenario A also requires the use of Waste Management's Recycling Facility along with two (2) additional new single-stream material recovery facilities (MRFs).

In addition to infrastructure, the SWA plan includes implementation of new and expanded programs focused on increasing diversion and reducing waste generation, including restoring countywide curbside recycling, adding yard waste collection and food waste drop-off programs, expanding reuse and diversion initiatives, and **reducing municipal solid waste (MSW) collection from twice-per-week to once-per-week** to encourage waste reduction.

At this time, the specific locations, timing, and development responsibilities for the proposed facilities have not been fully defined. Additionally, participation in the SWA would require municipalities to adopt uniform, **Authority-wide policies and implement flow control**, under which the SWA would designate where waste must be delivered. This could include directing waste to private disposal facilities, **including waste-to-energy (WTE) incinerators or other private or public regional facilities, as determined by the Authority**. This represents a shift from the City's current system to a more centralized, **regionally controlled model**.

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Participation in the SWA would also require a **long-term commitment, joining the existing forty (40) year Interlocal Agreement, through 2063**. In addition, the potential impacts of SWA participation on existing service structures for certain property types, including condominium and multi-family residential units, remain unclear. Currently, condominium residential units operate under an open market system and are not required to utilize the City's franchised hauler, allowing them to independently negotiate collection and disposal services, while apartment complexes are required to utilize the City's franchised hauler under established rates and service agreements. It is not yet known whether participation in the SWA would require modifications to these existing arrangements, which could impact service flexibility, provider selection, and cost structures for condominium and multi-family properties.

Recognizing the need for immediate action as well as long-term planning, the City also has the opportunity to leverage newly developed private infrastructure within its jurisdiction. **Waste Management has recently constructed a \$90 million, 127,000-square-foot advanced recycling facility in Pembroke Pines**, capable of processing up to 275,000 tons of source-separated recyclable materials annually using optical sorting and artificial intelligence technologies. The facility is expected to recover up to 95% of recyclable materials and represents one of the most advanced recycling operations in the region. It functions as a recycling processing center and has an adjacent transfer station to transport the remaining solid waste residual materials to permitted landfill disposal facilities outside the City.

It is important to distinguish the role of this new Waste Management facility, which is designed to process source-separated recyclables, materials that residents and businesses have already separated from their regular trash. It does not process mixed municipal solid waste. For context, in Calendar Year 2021, the City collected approximately **9,000 tons of source-separated recyclable materials**. At a 95% recovery rate, this would result in approximately 8,550 tons of material being recycled annually through the new Waste Management facility. However, this estimate assumes that the material placed in recycling carts is appropriate and free of contamination. In practice, contamination, such as non-recyclable materials placed in recycling carts, can reduce the amount of material that can be successfully recovered, resulting in a lower actual recycling output.

While this represents an improvement over the previous facility's recycling rate of approximately 80-85%, the enhanced efficiency applies only to the portion of waste that is already source-separated and does not significantly impact the larger volume of waste generated by the City which has its ultimate fate in landfill deposition.

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In contrast, the City's PROJECT is being designed to process **mixed municipal solid waste and recyclables together**, without requiring source separation by residents. This approach allows for recovery of recyclable materials, processing of organic waste and wastewater biosolids through technologies **such as anaerobic digestion**, and conversion of waste into renewable energy, not using incineration.

While certain waste streams, such as non-yard waste bulk materials and portions of construction and demolition waste, may require alternative or supplemental disposal methods, the City's upcoming RFQ process will evaluate innovative technologies and solutions that may further expand the PROJECT's capabilities and reduce reliance on traditional disposal.

Using the same 2021 data for comparison:

- The City generated approximately **59,000 tons of combined municipal solid waste and source-separated recyclables**
- The PROJECT is anticipated to **divert approximately 70% or more of this material**, equating to approximately **41,300 tons annually diverted from landfill or incineration**

This represents a **substantially greater impact** compared to traditional recycling alone.

In addition, this estimate does not include other significant waste streams that could be incorporated into the PROJECT, including:

- **Bulk Waste:** ~19,000 tons (A portion of this total consists of yard waste, which could be incorporated into the PROJECT if the City elects to separate yard waste from bulk waste. This separation is currently an option under the City's Bulk Waste Collection agreement; however, the exact quantity of yard waste within the total bulk waste stream is currently unknown.)
- **Commercial Waste:** ~26,000 tons
- **Wastewater Biosolids:** ~500 dry tons

Incorporating these additional streams further increases the City's ability to reduce landfill dependence and enhance overall system sustainability.

These options could be considered as components of a **layered and integrated system** with the:

- The **SWA** providing regional coordination, education, policy alignment, and system-wide planning

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- **Waste Management** providing advanced recycling and logistics infrastructure for source-separated materials
- The **City's PROJECT** providing comprehensive waste processing, conversion, and volume reduction

Under this approach, the City's PROJECT has the potential to function as a regional processing asset that complements both SWA and private sector operations. The SWA could utilize the City's facility as part of its long-term system, directing waste to a local processing solution that provides enhanced recycling and diversion capabilities. Similarly, Waste Management's recycling operations could continue to recover marketable materials, while remaining waste could be further processed through the City's facility to extract additional value, reduce landfill volumes, and generate renewable energy.

Residual materials that cannot be processed through advanced technologies would continue to be managed through existing transfer and disposal infrastructure, ensuring continuity of service and system reliability. In addition, other waste streams currently destined for landfill disposal may be partially redirected to the City's facility for further recovery and conversion, improving overall system performance.

This creates a **complementary system** that maximizes recovery, minimizes waste, and leverages both public and private infrastructure, where:

- The **SWA** could provide regional coordination and policy alignment
- **Waste Management** could provide advanced recycling and logistics infrastructure
- The **City's PROJECT** could provide waste processing, conversion, and volume reduction

A key advantage of the technologies under evaluation for the PROJECT is the ability to process mixed waste streams, including organic materials, without requiring residents to separate recyclables. This creates the potential for a **simplified, single-cart collection system**, offering:

- Increased convenience for residents
- Reduced contamination in recyclable materials
- Improved overall recovery and diversion rates
- More efficient collection operations
- Potential reduction in long-term collection and disposal costs

In addition, the PROJECT's ability to process organic waste and **generate renewable energy, without relying on the need to build incineration or combustion-based waste-to-**

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energy technologies, supports the City's sustainability goals, state goals and nationwide legislative trends while reducing reliance on landfill disposal.

This combination of options enables the City to pursue a **phased and flexible strategy**:

- **Near-Term:** Utilize existing infrastructure, including the Waste Management facility, to immediately improve recycling performance and reduce landfill dependence
- **Mid-Term:** Continue evaluation of the SWA to determine whether regional participation provides long-term value and alignment with the City's objectives
- **Long-Term:** Advance the City's PROJECT to establish a resilient, **locally controlled waste processing solution** that enhances sustainability and reduces reliance on external disposal

Importantly, these approaches are not mutually exclusive and present an opportunity for **integration and collaboration**. By advancing these efforts in parallel, the City maintains flexibility, improves its negotiating position, and avoids premature commitment to any single approach.

The anticipated benefits of this integrated strategy include:

- Immediate improvement in recycling and diversion rates
- Significant reduction in landfill dependence
- Greater flexibility in responding to regional developments
- Enhanced negotiating position with regional and private partners
- Simplified waste collection for residents and improved resident convenience
- Reduced contamination and improved recycling efficiency
- Increased recovery of materials and renewable energy production
- A long-term disposal solution for wastewater biosolids; eliminating land-application associated pollution.
- Greater long-term cost transparency and stability

At this stage, the City is focused on continuing due diligence, advancing procurement and site readiness for the PROJECT, evaluating SWA participation, and exploring interim operational opportunities utilizing existing infrastructure.

City Commission direction is requested to:

1. Support continued evaluation of SWA participation, including financial, operational, and governance considerations

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2. Authorize advancement of the City's PROJECT through the RFQ process to further define feasibility, technology, and costs
3. Support exploration of interim recycling strategies utilizing the Waste Management facility

This approach ensures that the City of Pembroke Pines remains proactive, informed, and strategically positioned to deliver a sustainable, cost-effective, and resilient solid waste management system, while maintaining the flexibility to adapt as regional partnerships and technologies evolve.

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ABSTRACT

The City has a strong interest in building a sustainable future and improving waste management by the development of programs to divert waste from landfills, advocate against the use of incineration for waste management and explore alternative, sustainable waste treatment options. This interest is clearly stated within the City's Strategic Plan's goals of promoting renewable energy and exploring alternative sustainable waste treatment options along with the City's Green Plan, which emphasizes waste reduction, renewable energy generation, carbon reduction, and sustainable resource management.

To this end, on November 22, 2022, the City issued a Request for Letters of Interest, AD-22-04, "Disposal of Solid Waste" to identify firms that can meet the City's future solid waste management needs, consistent with these long-term objectives.

On February 21, 2023, the City opened two responsive Letters of Interest from the following interested parties:

1. Burcell Technologies, Inc (Anerobic Digestion with emerging pre-treatment technology)
2. Hughes Energy, LLC (Emerging Technology - Steam Autoclaving - a type of pyrolysis)

In addition, the City also received two No Bid responses from the following interested parties:

3. FCC Environmental Services (Waste-to-Energy – Incineration)
4. Waste Management, Inc. of Florida (Recycling and Transfer)

Based on the review of these responses, City Staff identified significant interest in emerging waste technologies that have the potential to increase landfill diversion, increase recycling, and generate renewable energy, such as Renewable Natural Gas (RNG) and solid fuels. Additionally, these technologies provide opportunities to incorporate municipal biosolids into the process, reducing reliance on land application of biosolids, and its environmental impact, while converting waste into beneficial energy resources.

As a result, the City would like to advance to the next phase through the issuance of a Request for Qualifications (RFQ) with a Design Criteria Package, for a project now referred to as *Solid Waste Recycling and Sustainable Energy Recovery Solution* (PROJECT). The PROJECT is intended to be constructed by a Design-Build Firm in accordance with the Consultants Competitive Negotiation Act (CCNA) 287.055 FS.

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This White Paper provides an overview of the City's understanding of the technologies, processes, and development considerations necessary to inform the City Commission for approval to advance the PROJECT through the next phase of the procurement process.

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PART 1 - IDENTIFICATION OF NEED

City leadership and its citizens have identified a need to implement environmentally sound solid waste management practices which provides for a long-term, reliable solution and includes an increase recycling levels to meet or exceed EPA nationwide goals of recycling 50% of waste by 2030 and the State's goal of 75%; and maintains an affordable rate structure for its residents for the coming decades. The City's waste management needs include:

1. Increasing diversion of solid waste that currently requires landfill disposal.
2. Improving overall recycling performance and material recovery.
3. Identifying alternatives to land application of bio-solids.
4. Exploring opportunities for energy recovery from waste streams, where feasible and environmentally responsible.
5. Reducing greenhouse gas emissions (carbon emissions), including those associated with landfill disposal and energy consumption.

1.01 REGULATORY IMPETUS

Below is an excerpt from Florida Statute Chapter 403 – Environmental Control, Part IV, Resource Recovery and Management:

A. 403.7032 Recycling

(1) The Legislature ***finds that the failure or inability to economically recover material and energy resources from solid waste results in the unnecessary waste and depletion of our natural resources.*** As the state continues to grow, so will the potential amount of discarded material that must be treated and disposed of, necessitating the improvement of solid waste collection and disposal. ***Therefore, the maximum recycling and reuse of such resources are considered high-priority goals of the state.***

(2) ***By the year 2020, the long-term goal for the recycling efforts of state and local governmental entities, private companies and organizations, and the general public is to recycle at least 75 percent of the municipal solid waste that would otherwise be disposed of in waste management facilities, landfills, or incineration facilities.*** However, ***any solid waste used for the production of renewable energy shall count toward the long-term recycling goal as set forth in this part.***

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PART 2 - MISSION STATEMENT

2.01 MISSION STATEMENT

The City Strategic Plan identifies clear Environment and Sustainability goals that include reducing environmental impacts, enhancing resource efficiency, increasing recycling and landfill diversion, and promoting renewable energy and long-term sustainable practices. Consistent with these commitments, the City seeks to advance alternative, environmentally responsible waste treatment options that support both economic and operational sustainability for residents. These priorities reflect the City's Green Plan, which emphasizes waste reduction, renewable energy generation, carbon reduction, and sustainable resource management.

To advance these goals, the City seeks to identify cutting-edge technology companies capable of providing innovative recycling waste-processing and renewable energy solutions. Through this effort, the City intends to evaluate systems and procedures that can manage a wide range of municipal waste streams, including municipal solid waste, yard waste, agricultural waste, and municipal biosolids, with the objective of **maximizing marketable recyclables, reducing landfill dependency, lowering carbon emissions and energy usage, and supporting the production of renewable energy such as Renewable Natural Gas, solid fuels, or other sustainable energy products. All solutions must remain consistent with the City's strategy to move away from traditional waste-to-energy (burning, incineration, combustion or other ash-producing processes) and to move toward alternative, sustainable waste treatment, energy recovery options.**

To further enhance sustainability and reduce operational energy consumption, the City will also consider facilities that incorporate **on-site renewable energy features such as roof-mounted or ground-mounted solar photovoltaic systems, as well as Floating Photovoltaic (FPV) systems installed on suitable water bodies located on or adjacent to the property.** These renewable energy elements support the City's goals for increasing energy efficiency, reducing carbon emissions, lowering facility operating costs, and promoting **environmentally responsible infrastructure.**

This approach to renewable energy and long-term sustainable practices is also aligned with the direction established in the Broward County Regional Solid Waste and Recycling Master Plan (2025). The County's plan provides a long-term regional framework but acknowledges that implementation will occur in phased, incremental steps over many years. The Master Plan identifies substantial limitations in available County-level infrastructure, notes that new countywide facilities may not be immediately feasible, and explicitly encourages municipalities to pursue local strategies, innovative technologies, and early adoption of

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sustainable practices that complement the anticipated regional system. The County also stresses the importance of flexibility, resilience, renewable energy, and the evaluation of emerging technologies, including advanced recovery systems, organics-to-energy solutions, and non-combustion waste-processing methods.

2.02 ROADMAP

In order to proceed with the PROJECT, it will be necessary for the City to follow traditional land development and procurement procedures that are loosely represented in the following flow chart depicting two separate tracts. Each of these which will need to be executed together on a parallel course, coming together at the end of the process with the start-up and commissioning of the proposed facility:

- A. Land preparation track
- B. System procurement track

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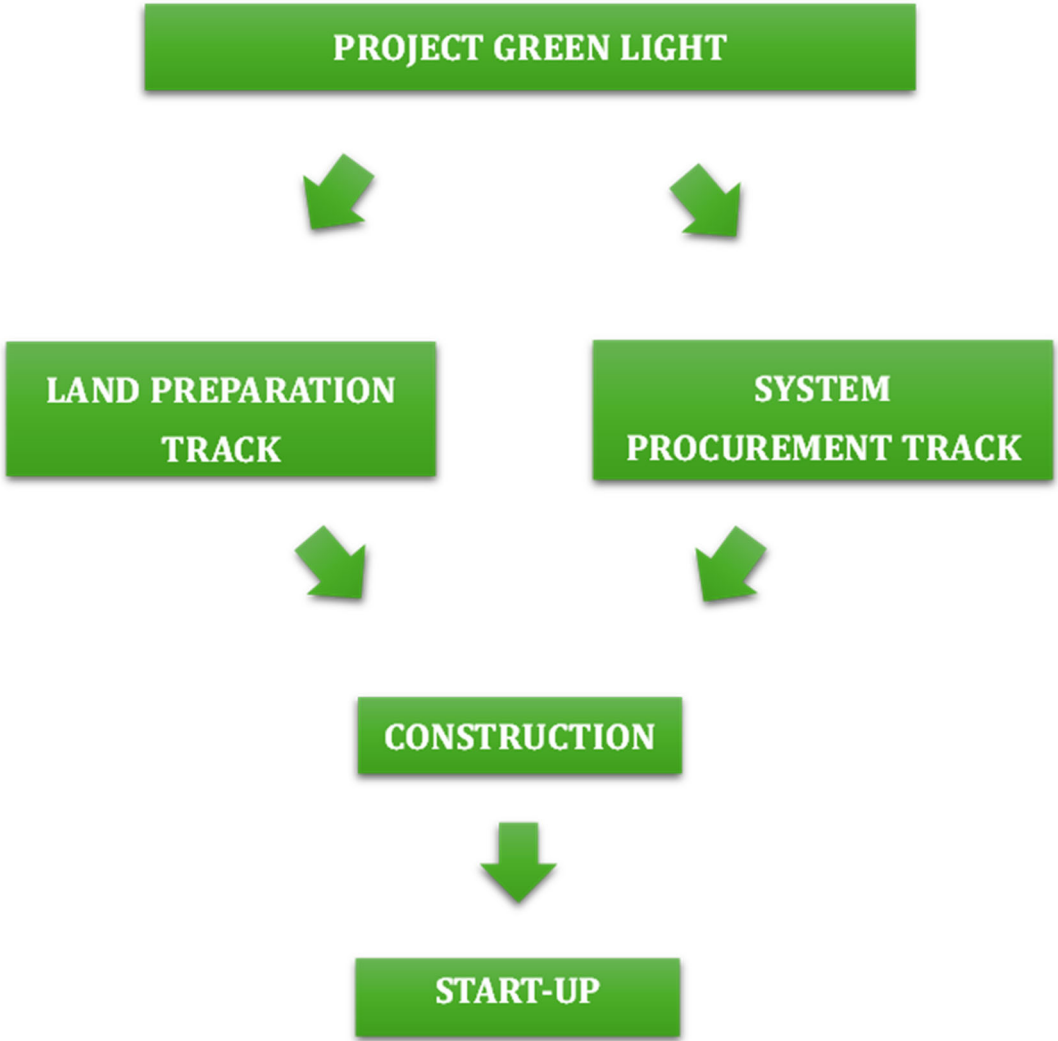


Figure 2-1 - GENERALIZED PROJECT FLOW CHART



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PART 3 - LAND PREPARTATION TRACK

3.01 IDENTIFICATION OF LOCATION

The City has identified a 56-acre parcel of land located on Pembroke Road between SW 198th Avenue and SW 200th Avenue (formerly known as The Estates of Swan Lake Corp.). This parcel is owned by the Windmill Reserve Home Owners Association, Inc. (Windmill) and serves as off-site wetland mitigation for the Windmill Lake Estates, a neighborhood in Weston. Please refer below to *Figure 3-1 – Subject Parcel Location Map*.



Figure 3-1 - SUBJECT PARCEL LOCATION MAP

This parcel is recognized for its proximity to US Highway 27 and Pembroke Road as well as being adjacent to the Waste Management Reuters Recycling Facility. This location provides for efficient vehicular access with minimal “in-City” traffic impacts. The proximity to Reuters has the potential to create a type of “Recycling and Sustainability Park” of common land use and public interest. The Land Sale Agreement due diligence period began August 2025 and will run to August 2027. This 24-month due diligence period was requested by the City due to time required for the Government Approvals required to build on this land due to wetlands mitigation on an existing Conservation Easement. The following is a list of the potential Government Approvals required for the development of the PROJECT:

1. South Florida Water Management District/Florida Department of Environmental Protection Environmental Resource Permit (ERP)
 - a. Conservation Easement Release ERP
 - b. Surface Water Management Works ERP

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2. Broward County Resilient Environment Department Environmental Permitting Division Environmental Resource License
3. US Army Corps of Engineers Clean Water Act Section 404 – Dredge and Fill Permit and Section 408 – Civil Works Clearance
4. South Broward Drainage District - Surface Water Management Permit
5. US Fish and Wildlife Service Endangered or Threatened Species
 - a. Florida Bonneted Bat
 - b. Eastern Black Rail (marsh bird)
 - c. Wood Stork (wading bird)
6. Local Development Permits

Other permits and licenses required for the construction of the PROJECT will be the responsibility of the Design-Build Firm. These are discussed in Section 4.

3.02 WETLANDS MITIGATION AND CONSERVATION EASEMENT

As discussed, the Windmill parcel is an existing wetlands mitigation area that was established in 1999 to compensate for the construction impacts of Windmill Lake Estates, a neighborhood in Weston. The wetlands mitigation consists of constructed wetlands and tree islands.

As a part of the regulatory jurisdiction of the South Florida Water Management District (SFWMD) and the Broward County Department of Planning and Environmental Protection (Broward County), this property is protected by a recorded Conservation Easement (CE). The purpose of the CE is to retain the land predominantly in its permitted wetlands and/or uplands state, to be maintained forever by the Grantor. In order to proceed with construction of the PROJECT at this location, the CE will require either a modification or removal and re-recording to accommodate the new land configuration. A portion of the existing underlying mitigation will be impacted by the new construction and will require re-construction or compensation elsewhere. In addition to construction mitigation impacts, there will also be a mitigation requirement associated with the CE release.

It has been estimated that the PROJECT will require up to 25 acres of developed or impacted area (plus secondary impacts) to accommodate the physical structure, setbacks, traffic circulation, green space and stormwater detention and storage. While the mitigation compensation has not been finalized, it has been estimated that the wetlands mitigation required to accommodate this development would be in the range of between 22 and 27

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mitigation credits plus some additional amount related to the CE. These quantities are preliminary and subject to change with permitting processes.

Both Agencies (SFWMD & Broward County) claim a real estate interest in the CE and will most likely require compensation for the modification or release of the CE. Based on other similar projects, it is anticipated that the Agencies' compensation will be in the form of compensatory acreage of up to 100 percent of the impact area or possibly 200% of the UMAM score. The **Uniform Mitigation Assessment Method (UMAM)** is a standardized scoring system used in Florida to evaluate the functional value of wetlands and surface waters, both before and after impacts, and to determine the amount of mitigation required to offset those impacts. Therefore, in addition to environmental mitigation credits required for project impacts, additional wetlands will likely need to be construction of a magnitude of up to 25 additional wetland credits. This places the total acreage of mitigation in the range of 50 wetland credits, more or less or as high as twice the construction impact mitigation credits. This additional amount would be a negotiated amount with the SFWMD and Broward County.

To accommodate this mitigation requirement, the following options have been investigated:

A. Construct wetlands mitigation on City-owned properties.

The City owns several properties available for construction conversion to wetlands mitigation. These properties, and their approximate size in acres, are as follows:

Nursery Site – 35.61 acres (City owned)

The Bald Eagle Site – 22.00 acres (City owned)

Holly Lake Site – 3.3 acres (City owned)

Holly Lake Fill Pit - 2.44 acres (City owned)

VD Homestead (SW 196th Ave.) – 4.00 acres (City owned)

Godofsky Parcel – 1 acre (City owned)

Glacuum Parcel – 9 acres (City owned)

Due to excessive construction costs, the Holly Lake Site and Holly Lake Fill Pit were deemed not financially viable for wetlands mitigation at this time. However, this site is being further evaluated for its potential to generate fill material. This process commonly referred to as “fill generation,” involves excavating soil from the site that can be reused elsewhere for construction

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purposes, such as raising land elevations, supporting infrastructure development, or preparing sites for building. The balance of the City-Owned Parcels total approximately 71.61 acres yielding an approximate environmental value of between 20 and 29 mitigation (UMAM) credits. The cost of construction of these mitigation credits is on the order of \$4.6M. Depending on the outcome of negotiations with SFWMD and Broward County, these parcels may or may not suffice for the mitigation requirement. Please refer to *Figure 3-2 – City-Owned Parcels*, below.

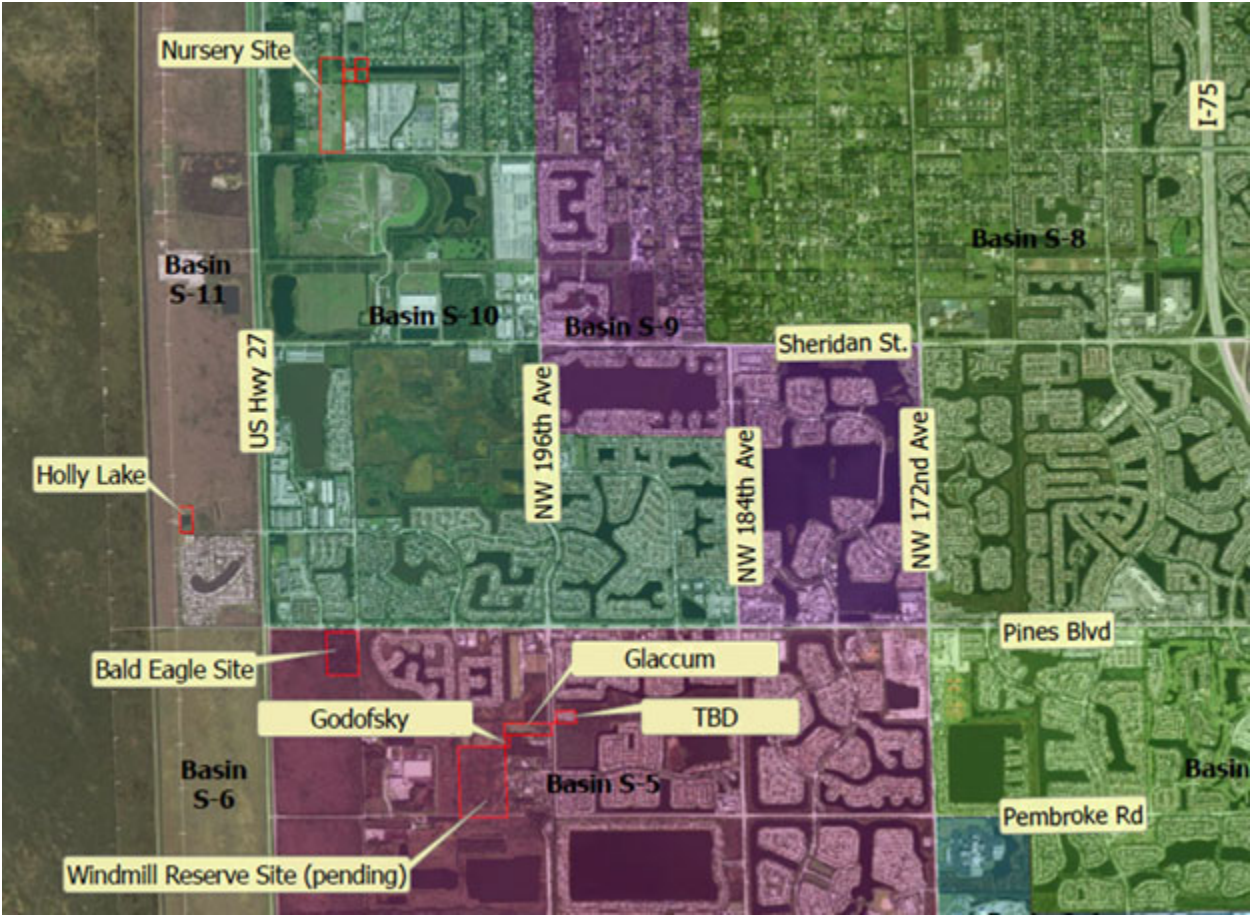


Figure 3-2 - CITY OWNED PARCELS

B. Purchase of off-site mitigation credits.

The City is very familiar with the concept of mitigation banks and the sale of excess mitigation credits as demonstrated through the City’s mitigation bank project over the years. However, at this time, there are no commercially available mitigation bank credits in the region and the City does not own any excess credits acceptable to the County or State. Therefore, the purchase of

off-site mitigation credits is not a viable option unless negotiations allow purchase of off-site mitigation credits in other parts of the State of Florida. While the concept of purchasing mitigation credits outside of the region is technically feasible under new state law, there is limited availability at a mitigation bank in St. Lucie County and there would likely be multipliers added to the required quantities which will drive the per unit cost up significantly. In addition, it is projected that the motivation for SFWMD and Broward County to release the CE would necessitate physical mitigation locally versus mitigation bank credits.

C. Sale of Excess Mitigation

The primary objective would to generate sufficient mitigation to meet all regulatory requirements associated with the development of the PROJECT. However, depending on the final design, permitting conditions, and negotiations with SFWMD and Broward County, it is possible that the City could develop mitigation acreage beyond what is ultimately required.

In the event that excess mitigation is created and permitted, the City may have the opportunity to establish a new Wetlands Mitigation Bank for the development and sale of any excess mitigation credits. Due to the low regional availability of excess credits, the potential market demand for such credits is expected to be strong. Recent data indicates that wetland mitigation credits have sold for approximately \$300,000 per credit. Due to supply and demand, it is speculated that this value may more than double in the coming years.

However, it should be noted that the creation of excess mitigation credits is not guaranteed and is heavily dependent on negotiations with the SFWMD and Broward County regarding final mitigation requirements associated with the CE release. It is possible that all or most mitigation generated by the PROJECT will be required to satisfy project-related impacts.

D. Summary of Mitigation Costs

As stated previously, the cost to develop City-Owned parcels into wetlands mitigation is on the order of \$4.6 million. However, since it is not clear at this time what the total number of mitigation credits or acreage which may be required for the negotiated CE release, the worst-case scenario for total mitigation costs has been estimated to be on the order of \$14 million. Therefore, this amount is being carried in the financial models at this time.

3.03 PEMBROKE ROAD

It is anticipated that the PROJECT will have vehicular access from Pembroke Road; either directly on Pembroke Road or via a constructed extension of SW 200th Avenue north from Pembroke Road. In either case, the current Pembroke Road construction and permitting schedule is not intended to be impacted. Rather, any driveway modifications required for the PROJECT are expected to be implemented via revisions and addendum to the current Pembroke Road construction process.

3.04 ADDITIONAL ENVIRONMENTAL PERMITS

A. Army Corps of Engineers (ACOE)

While the regulatory jurisdiction of the SFWMD and Broward County are clearly delineated, the jurisdiction of the ACOE is not as clear due to Federal lawsuits and rulemaking revisions. In an abundance of caution, City staff has conducted a pre-application meeting and is proceeding with an ACOE jurisdictional determination. Should ACOE jurisdiction be confirmed, then ACOE mitigation permitting will be required for the PROJECT. In all likelihood, the wetlands mitigation required for the SFWMD and Broward County will be acceptable to the ACOE. However, traditional timeframes associated with ACOE wetlands permitting are longer than the other agencies. It is possible that ACOE permitting may require an extension of the 24-month Government Approvals period condition of the Land Sale Agreement (LSA) if the City desires to have all approvals in hand prior to closing.

B. US Fish and Wildlife Service (USFWS) Endangered or Threatened Species

In addition to the aforementioned Environmental Mitigation Permits, it is likely that three Federally-endangered species are present in the construction area. They are the Florida bonneted bat (*Eumops floridanus*), aka the Florida mastiff bat, the eastern black rail (*Laterallus jamaicensis*), a sparrow-size secretive marsh bird, and the wood stork (*Mycteria americana*). These will require permitting through the Federal Fish and Wildlife Commission. These permits are expected to run concurrently with the other permits. Please refer to *EXHIBIT 3-3 - FLORIDA BONNETED BAT*, *EXHIBIT 3-4 - EASTERN BLACK RAIL AND EXHIBIT 3-5 - WOOD STORK*.



Figure 3-3 - FLORIDA BONNETED BAT

(SOURCE: US FISH AND WILDLIFE SERVICE)



Figure 3-4 - EASTERN BLACK RAIL

(SOURCE: US FISH AND WILDLIFE SERVICE)



Figure 3-5 - WOOD STORK

(SOURCE: US FISH AND WILDLIFE SERVICE)

While commonly found, the foraging area of the wood stork will need to be mitigated. However, the construction of the mitigation areas should suffice so no additional wetlands mitigation would be required.

3.05 PLANNING

Several land use issues will need to be orchestrated for the PROJECT to gain normal development entitlements. A discussion of the planning elements is as follows:

A. Land Use Amendment – Text Amendment to Agricultural Land Use

The City’s comprehensive plan will be amended via a land use plan text amendment (LUPA) to align the agriculture land use with the County’s land use plan. This amendment will be presented to the Planning and Zoning Board (local planning agency) and will require two hearings in front of the City Commission as well as review by the Broward County Planning Council. The full process typically takes about six to eight months from initiation to final County certification.

B. Rezoning of Property

The property is currently zoned A-E (Agriculture Excavation). The City would need to rezone the property or a portion of the property to R-R (Resource Recovery) to accommodate the proposed use. The adjacent property to the west (Reuter) shares this designation. This is a solely local approval process. It includes staff analysis, a combined LPA/Planning & Zoning hearing, and two City Commission readings. With no County or State involvement, the rezoning process generally takes about three to four months once the application is submitted and scheduled.

C. Traffic Study

The City will be required to procure a Registered Professional Engineer qualified in the practice of traffic engineering (Professional Traffic Operations Engineer) via the State CCNA process to perform a Traffic Study of the impact of truck traffic generated by the Project. This study is necessary to determine the appropriate elements of the Plat including Non-Vehicular Access Lines, Platted openings for connection(s) to Pembroke Road as well as impacts to other local roadway and US highway 27. This Study will likely need to be finalized prior to Plat and Site Plan Approval.

D. County Solid Waste Responsibilities 403.706 FS

The governing body of a county has the responsibility and power to provide for the operation of solid waste disposal facilities to meet the needs of all incorporated and unincorporated areas of the county. Unless otherwise approved by an interlocal agreement or special act, municipalities may not operate solid waste disposal facilities unless a municipality demonstrates by a preponderance of the evidence that the use of a county designated facility, when compared to alternatives proposed by the municipality, places a significantly higher and disproportionate financial burden on the citizens of the municipality when compared to the financial burden placed on persons residing within the county but outside of the municipality. However, a municipality may construct and operate a resource recovery facility and related onsite solid waste disposal facilities without an interlocal agreement with the county if the municipality can demonstrate by a preponderance of the evidence that the operation of such facility will not significantly impair financial commitments made by the county with respect to solid waste management services and facilities or result in significantly increased solid

Recycling and Sustainable Energy Recovery Solution

waste management costs to the remaining persons residing within the county but not served by the municipality's facility.

The City will be required to provide these financial calculations to Broward County to gain approval for the PROJECT.

E. Platting

The property is currently not platted. Therefore, a full plat submittal would need to be submitted to Broward County for their review. The City will need to hire a professional engineer or surveyor to process this application. Typical review time to plat recordation could be 9-12 months. The plat restrictive note must be consistent with the underlying land use and zoning before the County approves it.

F. Site Plan

The property will require a site plan to be processed through the Planning and Economic Development Department and reviewed by the City through the Site Plan process. The process will require appropriate Board hearings as determined by the Land Development Code and will likely require 3-5 months for the process to be complete. The site plan must be consistent with the permitted uses of the land use and zoning district and must comply with all applicable development standards within that district.

3.06 LAND PREPARATION TRACK SUMMARY

As discussed, there are a number of regulatory steps needed for the development of the PROJECT site. While more information will be forthcoming in the coming months, the general outline of actions is known at this time. It is intended that the City will obtain the necessary Governmental Approvals and prepare the Windmill site for the Design-Build Firm to construct the facility. The City's site preparation activities are expected to be limited to clearing, de-mucking, excavation and filling of the PROJECT area to achieve a stabilized, "table top" elevation suitable for development. Please refer to the flow chart below to add clarity to the process.

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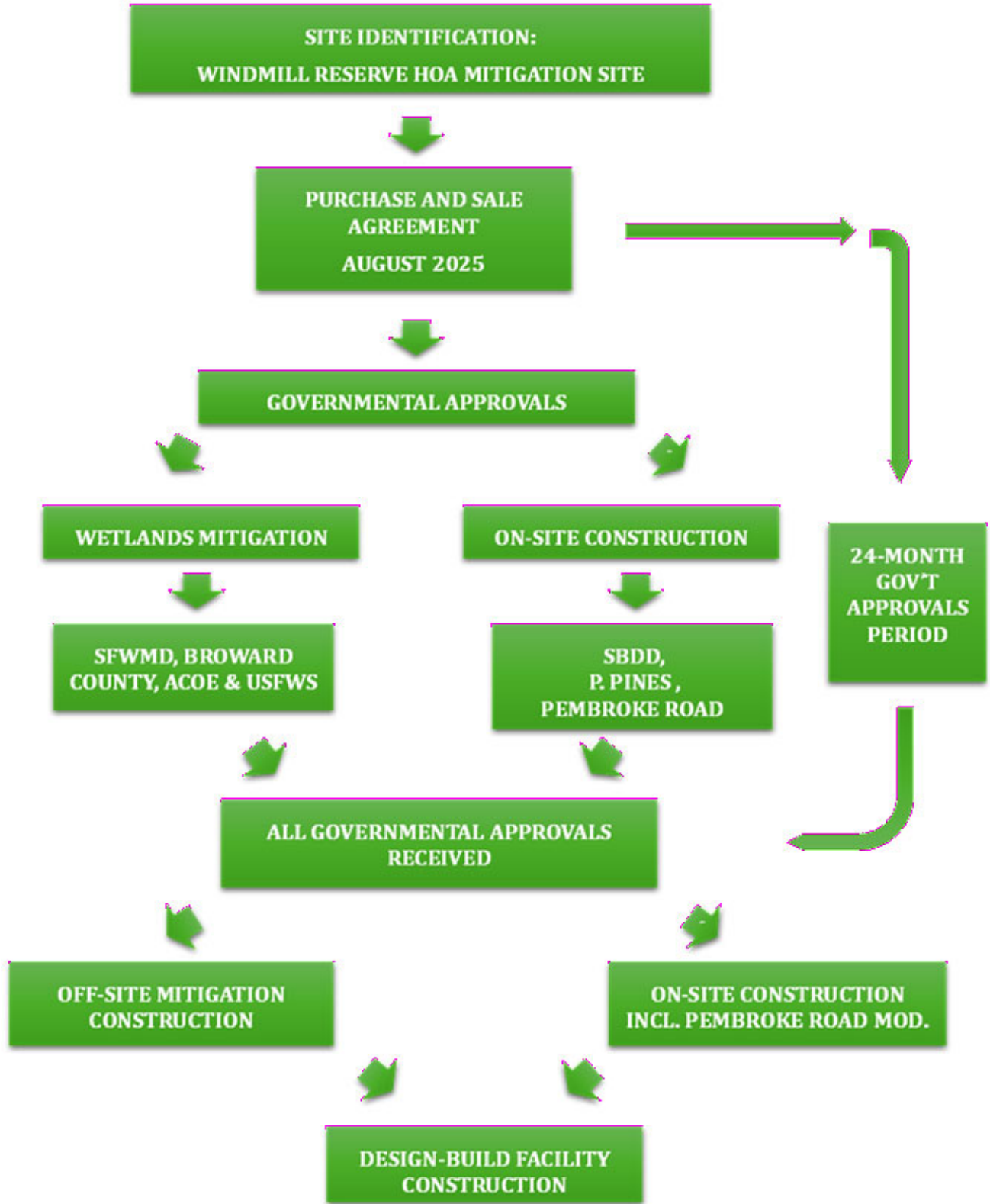


Figure 3-6 - GOVERNMENT APPROVALS FLOW CHART

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PART 4 - SYSTEM PROCUREMENT TRACK

4.01 REQUEST FOR LETTERS OF INTEREST

On November 22, 2022, the City issued a Request for Letters of Interest, AD-22-04, “Disposal of Solid Waste” to identify firms that can meet the City’s future solid waste management needs, consistent with these long-term objectives. On February 21, 2023, the City opened two responsive Letters of Interest from the following interested parties:

1. Burcell Technologies, Inc (Anerobic Digestion with emerging pre-treatment technology)
2. Hughes Energy, LLC (Emerging Technology - Steam Autoclaving – type of pyrolysis)

In addition, the City also received two No Bid responses from the following interested parties:

3. FCC Environmental Services (Waste-to-Energy – Incineration)
4. Waste Management, Inc. of Florida (Recycling and Transfer)

4.02 REQUEST FOR STATEMENT OF QUALIFICATIONS

Upon review and analysis of the Letters of Interest, City Staff have determined that there is significant interest in this project from emerging waste technologies. These indicators have warranted proceeding to the next step; issuance of a Request for Qualifications (RFQ) with a Design Criteria Package for this project now referred to as *Solid Waste Recycling and Sustainable Energy Recovery Solution (PROJECT)* to be constructed by a Design-Build Firm in accordance with the Consultants Competitive Negotiation Act (CCNA) 287.055 FS.

4.03 EVALUATION OF QUANTITIES

A. Municipal Solid Waste

The City generation of Municipal Solid Waste (MSW) including domestic and commercial garbage, recyclables, bulk trash and roll-off dumpsters is presented below in *TABLE 4-1 – CITY 5-YEAR SOLID WASTE GENERATION (TN)*. This data indicates a 5-year running average of 125,121 Tons per year.

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Description	CY 2021	CY 2022	CY 2023	CY 2024	CY2025
Garbage / Solid Waste	50,182	52,686	53,926	47,741	54,621
Source separated recyclable materials	8,841	(1)	(1)	(1)	(1)
Bulk	18,690	17,820	17,737	18,209	18,602
Commercial ⁽³⁾	25,732	27,118	30,190	31,004	27,313
Construction and Demolition (C&D) / Roll Off ⁽³⁾	23,397	24,536	26,592	25,688	24,981
Total⁽²⁾	126,842	122,159	128,444	122,642	125,517
⁽¹⁾ Collected with Solid Waste					
⁽²⁾ 5-year running average = 125,121					
⁽³⁾ The “Commercial” or “Roll Off” line item would include all Apartment Complexes, depending on what collection method is used at the specific location. Multi-family Service Unit (Condominium Residential Units) are open market and are not required to utilize the City’s contracted Waste Hauler, Waste Pro, and can negotiate their own agreements for Waste Collection and Disposal. However, the referenced table would include the waste generated by any Multi-family Service Unit (Condominium Residential Units) that is serviced by Waste Pro, as we have been advised that Waste Pro does not have a way of separating what tonnage was generated by those communities. Similar to Apartment Complexes, this waste would be listed under the line item for “Commercial” or “Roll Off” depending on what collection method is used at the specific location. Please note that waste generated at Multi-family Service Unit (Condominium Residential Units) that are serviced by any other company, besides Waste Pro, would not be included in the table as the City does not have that information.					

Table 4-1 - CITY 5-YEAR SOLID WASTE GENERATION (TN)

B. Wastewater Biosolids

The City’s wastewater treatment plant currently generates dewatered Class B biosolids, which are disposed of through land application. These biosolids are approximately 15% dry solids, after the dewatering process. The generation of wastewater biosolids is presented below in *Table 4-3 – City Wastewater Biosolids Generation in Wet Tons (WT)*.

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While land application is a common disposal method, it can present environmental concerns due to the high concentration of nutrients, such as nitrogen and phosphorus. When applied in excess or under certain conditions, these nutrients can contribute to runoff into nearby water bodies, potentially leading to water quality issues such as algal blooms and ecosystem imbalance.

In addition to nutrient content, biosolids contain organic material rich in carbon, which represents a potential source of energy. When processed through anaerobic digestion, this organic content can be converted into biogas, which can then be used to produce renewable energy. When combined with municipal solid waste (MSW) in a co-digestion process, biosolids can enhance overall energy production by increasing the available organic feedstock. Additionally, the inherent moisture content of biosolids can be beneficial in supporting the digestion process, reducing the need for supplemental water.

Diverting biosolids from land application to energy recovery processes has the potential to reduce nutrient loading to land and surface waters while creating a beneficial use for this material through renewable energy production.

It should also be noted that the State of Florida has recently updated its biosolids regulations to require land application of Class AA biosolids beginning in 2028. The City currently produces Class B biosolids, which are less costly to manage under existing practices, with the option of producing Class AA at a higher level of treatment and higher cost. Compliance with future regulations may require this additional treatment process, or other processes, which will significantly increase operational costs. These anticipated regulatory changes further support the evaluation of alternative management strategies, including energy recovery, as part of the PROJECT.

Description	CY2020	CY2021	CY2022	CY2023	CY2024
Wastewater Biosolids (Dry Tons) ⁽¹⁾	450	575	536	306	493
⁽¹⁾ Approximately 15% dry solids					

Table 4-2 - CITY WASTEWATER BIOSOLIDS GENERATION IN DRY TONS (DT)



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C. Population Projections

It is anticipated that the City will grow according to the latest population projections. The PROJECT must account for future additional demands including:

1. Increase in diversion of solid waste requiring disposal.
2. Increase in the current recycling rate.
3. Increase in the number of commercial and multifamily accounts.

Population projections are presented below in *TABLE 4-2 – CITY POPULATION PROJECTIONS* and *FIGURE 4-2 – CITY GRAPHICAL POPULATION PROJECTIONS*. This data is provided to assist in long term planning and infrastructure sizing over a 20-year horizon and beyond.

SOURCE	2020	2025	2030	2035	2040	2045	2050
Broward County Urban Planning Division's 2024 Population Forecast Allocation Model (PFAM) which distributes county-wide population forecasts prepared by the University of Florida Bureau of Economic and Business Research (BEBR) to local municipalities.	170,447	174,599	175,669	176,381	175,604	178,593	181,328

Table 4-3 - CITY POPULATION PROJECTIONS



Figure 4-1 - CITY GRAPHICAL POPULATION PROJECTIONS

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D. System Flexibility and Future Scalability

In addition, the PROJECT should be designed with flexibility to accommodate potential future system needs and regional collaboration opportunities. The initial phase will be sized to meet the City’s current demand, while incorporating foundational infrastructure that allows for scalable expansion of processing capacity in future phases. This phased and scalable approach ensures the PROJECT can adapt to evolving conditions, including changes in waste generation, advancements in processing technologies, and opportunities to support broader regional system integration where appropriate, and maximize long-term efficiency. Please refer to Expected Capacity.

E. Expected Capacity

Consistent with the phased and scalable design approach described above, the PROJECT shall be adequately sized for the current and future needs of the City. The initial phase capacity is designed to accommodate the City’s existing waste stream, while the overall system is structured to allow for future expansion through the addition of processing equipment and supporting infrastructure as needed.

The following capacities are anticipated:

Initial Phase Capacity	187,000 Tons Per Year
Future Total Capacity	240,000 Tons Per Year

Table 4-4 - SYSTEM EXPECTED CAPACITY

4.04 DESIGN-BUILD FIRM PERMITTING RESPONSIBILITIES

The following is a generalized outline of the development process which the Design-Build Firm will be required to follow. This assumes that the City has procured the aforementioned permits and has constructed the PROJECT site to a filled, table top elevation ready for development. This list is not intended to be exhaustive, but rather to provide guidance to what may be required by local Authorities having jurisdiction over development of the PROJECT prior to construction:



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1. Apply for and obtain State and/or County Solid Waste Facility License from FDEP and/or Broward County Resilient Environment Department Environmental Permitting Division.
2. Apply for and obtain drainage permits for the secondary drainage system including SFWMD, Broward County Environmental Resource License and SBDD.
3. Apply for and obtain a water main extension permit from Florida Department of Environmental Protection (FDEP) for all domestic and fire service potable water main extensions.
4. Apply for and obtain a Wastewater License from Broward County Resilient Environment Department Environmental Permitting Division as delegated by FDEP for all sanitary sewer mains, manholes and sewage pumping station.
5. Apply for and obtain an Air Quality License from FDEP and/or Broward County Resilient Environment Department Environmental Permitting Division.
6. Apply for and obtain a Storage Tank Facility License from FDEP and/or Broward County Resilient Environment Department Environmental Permitting Division.
7. Apply for and obtain an irrigation permit as required by the SFWMD.
8. Apply for and obtain Site Plan Approval through the City of Pembroke Pines.
9. Apply for and obtain a Building Permit through the City of Pembroke Pines.

Please refer to the flow chart below to add clarity to the process.

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Figure 4-2 - PROCUREMENT FLOW CHART

4.05 UTILITIES

A. General

The PROJECT must include all costs related to necessary utilities including, but not limited to, water, sewer, irrigation, stormwater drainage, electric, natural gas and internet access.

Water and sewer are addressed in this Section whereas stormwater drainage is addressed elsewhere and electricity, natural gas, internet access, etc. are not addressed herein as the City can provide no guidance on these. All Proposers are required to look to those utility providers for more information.

B. Water

All potable water and fire protection requirements of the PROJECT must be met through connection to existing water distribution facilities.

A 16" PVC water main exists on Pembroke Road on the south side of the PROJECT.

a. A water main extension, size to be determined by the PROJECT, or a minimum of 8" diameter must be included to provide for the domestic and fire protection needs. The water main extension must be looped around the project and connected to the 16" WM in two locations including 16" and 8" isolation valves.

b. Fire protection design and devices shall be as required by the NFPA, Florida Fire Prevention Code, Broward County Code of Ordinance and the City of Pembroke Pines Fire Prevention Division.

c. Domestic water service meter and backflow prevention shall be in accordance with State and County requirements and City Code of Ordinances.

1) Water meter and backflow prevention shall be sized by the PROJECT.

2) Backflow prevention devices shall be a part of the plumbing system and be included in the cost of the PROJECT.

3) All water meters shall be ultrasonic type as manufactured by Neptune and shall be included in the cost of the PROJECT.

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C. Irrigation

The use of potable water for irrigation is prohibited by the City Code of Ordinances. Irrigation water must be provided by on-site lakes or wells as permitted by the SFWMD. The cost of all irrigation pumps, piping, permitting, etc. shall be included in the cost of the PROJECT.

D. Sewer

Sanitary sewer shall be collected through on-site service laterals, mainlines and manholes to an on-site sanitary lift station.

It is anticipated that a sewage lift station and forcemain will be required and must be permitted through the County and City to FDEP requirements. A lift station report shall be required which identifies the proposed and future wastewater generation estimates, wetwell, pump and pipe sizing in accordance with City, State and County requirements. The lift station report shall be signed and sealed by a Florida Registered Engineer and shall be subject to the approval of the City Engineer.

All costs associated with design, permitting and construction shall be included in the cost of the PROJECT.

4.06 DRAINAGE

A. City-Obtained Drainage Permits

It is anticipated that through the Environmental Permitting process, the City will obtain Master Permits through the SFWMD, Army Corps of Engineers, the South Broward Drainage District (SBDD) and Broward County.

The Master Permits will allow the City to apply for and obtain a Phase I construction permit to perform the primary land development actions on the Windmill site including clearing, de-mucking, excavation and filling the PROJECT area. This will leave the site filled to a level, or *table-top*, elevation 5.0 North American Vertical Datum (NAVD).

B. PROJECT-Obtained Drainage Permits

It will be the responsibility of the PROJECT to apply for, and obtain the remaining drainage permits, or Phase II construction permits, for the construction of all on-site drainage facilities. This is commonly referred to as the secondary drainage system and shall include all pavement, retention and

Recycling and Sustainable Energy Recovery Solution

detention facilities, industrial pre-treatment, catch basins, baffles and pipes necessary and shall be included in the cost of the PROJECT.

All on-site paved areas including, but not limited to, roadways, parking, circulation, storage, etc. shall be designed as a heavy-duty pavement section commensurate with the vehicular traffic anticipated by the PROJECT. The pavement section design shall be signed and sealed by a Florida Registered Engineer and shall be subject to the approval of the City Engineer.

Finished floor elevations shall be set in accordance with all applicable codes. Including, but not limited to, FEMA, the Florida Building Code, the SBDD basin standards and ASCE 24 for a critical facility.

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PART 5 - SCHEDULE

The following presents a generalized timeline with Fiscal Year divisions and quarterly sub-division for both the City Portion – Land Preparation Track and the Design-Build Firm Portion – System Procurement track. The overall conclusion is that start-up of the PROJECT may occur in early 2030.

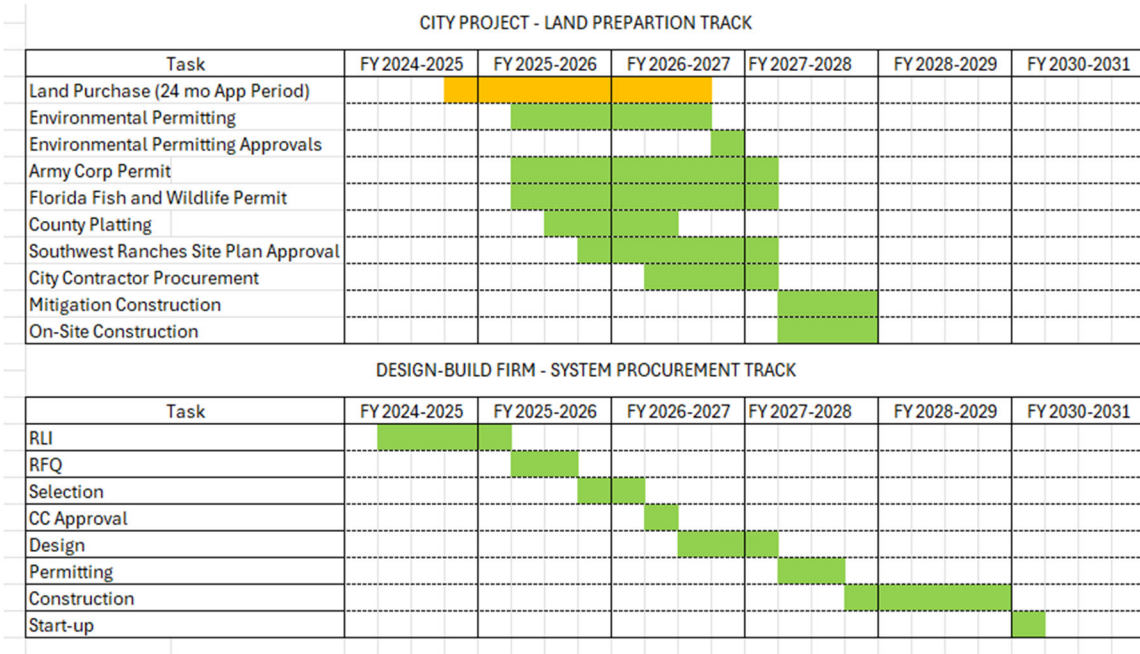


Figure 5-1 - PRELIMINARY PROJECT SCHEDULE

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PART 6 - CURRENT STATUS OF CITY WASTE DISPOSAL

The City of Pembroke Pines currently operates under a combination of collection and disposal agreements that have evolved over time in response to changing market conditions, cost considerations, and operational challenges

6.01 BACKGROUND – PRIOR RECYCLING AND DISPOSAL AGREEMENT

From 2004 through January 1, 2022, the City maintained an agreement with **Reuter Recycling of Florida, Inc.**, which was subsequently acquired by Waste Management, for recycling and disposal services. Upon expiration of this agreement, the City was unable to successfully negotiate a new contract under acceptable financial and operational terms. Due to increasing contamination rates in the recycling stream and rising processing costs, the City made the decision to **suspend its residential recycling program effective January 1, 2022.**

6.02 CURRENT WASTE DISPOSAL AGREEMENT – WASTE CONNECTIONS

Subsequently, the City entered into an agreement with Waste Connections of Florida, Inc. for waste disposal services. This agreement expires on **September 30, 2026** and includes options for **additional one-year renewals**, subject to mutual agreement. Under this arrangement:

- **Waste is transported to transfer stations, including:**
 - Deerfield Beach Recycling and Transfer Facility
 - Pembroke Park Recycling and Transfer Facility
- Waste is then transferred to the **JED Landfill in St. Cloud, Florida**

The JED Landfill is a non-hazardous solid waste facility located on approximately 2,179 acres in Osceola County and has been in operation since 2004. It is designed to meet or exceed federal environmental standards and is permitted by the Florida Department of Environmental Protection.

Waste received at the facility is weighed, placed, compacted, and managed to maximize capacity and control environmental impacts. Over time, waste undergoes natural decomposition, producing **landfill gas**, primarily **methane**, which is **captured and converted into renewable energy**. The facility includes **over 200 gas extraction wells** and has the **capacity to generate approximately 9.2 megawatts of electricity**, enough to **power up to 8,000 homes**.

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6.03 RESIDENTIAL AND COMMERCIAL SOLID WASTE COLLECTION – WASTE PRO

The City has an agreement with **Waste Pro of Florida, Inc.** for **residential and commercial** solid waste collection services.

- Commenced on January 2, 2022 and runs through **September 30, 2028**
- Includes an option for **one (1) additional seven (7)-year extension**, subject to mutual agreement
- This is a **Collection-Only Solution** for **Residential Waste**, in which:
 - The **City is responsible for paying disposal costs**
 - Municipal Solid Waste (MSW) and recycling are currently **commingled** and collected in the same cart
 - The agreement includes provisions allowing the City to **reinstate separate recycling collection in the future**

However, please note that **Commercial waste** collection is also provided by Waste Pro under a **Turnkey Solution**, in which **Waste Pro is responsible for both collection and disposal costs (tipping fees)**.

6.04 BULK WASTE COLLECTION – EASTERN WASTE SYSTEMS (EWS)

The City currently has an agreement with **Eastern Waste Systems, Inc. (EWS)** for bulk waste/trash and bulk yard waste collection services. This agreement:

- Commenced on January 2, 2022 and runs through **September 30, 2028**
- Includes an option for **one (1) additional seven (7)-year extension**, subject to mutual agreement
- Is structured as a **Turnkey Solution**, where **EWS** is responsible for **paying all disposal (tipping) fees**

The agreement provides two service options:

- **Mixed Bulk Waste Collection** (current approach): Residents commingle bulk trash and bulk yard waste in a single pile
- **Separated Collection Option**: One pickup dedicated to bulk trash and another to bulk yard waste

The City currently utilizes the **mixed bulk waste option**, allowing residents to combine both waste streams for convenience.

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PART 7 - HISTORY & STATUS OF THE SOLID WASTE AUTHORITY OF BROWARD COUNTY

7.01 INTEGRATED SOLID WASTE AND RECYCLING SYSTEM MOU

The City of Pembroke Pines has been actively engaged in regional solid waste planning efforts for several years. On August 7, 2019, the City Commission approved the execution of a Memorandum of Understanding (MOU) with Broward County and other participating municipalities to collaboratively study and develop an integrated solid waste disposal and recycling system. The participating entities recognized that a regional approach could provide both short-term and long-term benefits, including environmental advantages and potential cost efficiencies, and committed to working toward a comprehensive and coordinated system.

7.02 SOLID WASTE WORKING GROUP & TECHNICAL ADVISORY COMMITTEE

As part of this effort, the Solid Waste Working Group (SWWG) was established, consisting of elected municipal officials from across Broward County and a County Commissioner. The SWWG was tasked with working cooperatively to recommend strategies, governance structures, and solutions for a regional solid waste system. Supporting this effort, a Technical Advisory Committee (TAC) was formed to evaluate operational considerations, coordinate technical analysis, and provide recommendations to the SWWG, including the engagement of specialized consultants.

7.03 REGIONAL SOLID WASTE GENERATION STUDY

On February 2, 2022, the City Commission approved the first amendment to the MOU to jointly fund a Regional Solid Waste Generation Study. This study was intended to better understand the volume and composition of waste generated countywide and to support the development of a coordinated, cost-effective, and environmentally sustainable system.

7.04 DRAFT ILA TO ESTABLISH THE SOLID WASTE AUTHORITY (SWA)

In September 2022, participating municipalities were presented with a draft Interlocal Agreement (ILA) to establish the Solid Waste Disposal and Recyclable Materials Processing Authority of Broward County (SWA), and municipalities, including Pembroke Pines, provided comments and feedback as part of an ongoing collaborative process.

On August 23, 2023, the City Commission held a workshop to evaluate adopting the proposed ILA. At that time, the ILA outlined the creation of a new independent regional entity responsible for managing solid waste processing, recycling, and disposal across participating jurisdictions. However, the proposed structure required municipalities to commit prior to the development of a Master Plan that would define system infrastructure, costs, and operational details. **The City Commission ultimately determined not to join the SWA at**

Recycling and Sustainable Energy Recovery Solution

that time due to several concerns, including uncertainty regarding long-term costs, lack of a defined system plan, governance considerations, and policy concerns related to potential disposal technologies, **including incineration**. The ILA also required upfront financial participation, providing that until the Authority is able to fund its budget through special assessments or other mechanisms, participating entities must contribute toward operational costs capped at \$2,000,000 annually, allocated on a pro rata basis by population. The County would fund 50% of consultant costs associated with development of the Master Plan, with the remaining 50% funded by municipalities, along with all other startup costs. Based on these provisions, **the City of Pembroke Pines' estimated annual contribution was approximately \$231,996.46 at 75% participation and \$173,997.35 at full participation.**

Ultimately, Broward County, along with 28 of the 31 municipalities, **representing approximately 83% of the County's population**, approved the Solid Waste Authority (SWA), resulting in its formal establishment as an independent legal entity; the municipalities that did not join include the **City of Pembroke Pines, Hallandale Beach, and Pompano Beach.**

7.05 CITY'S OPPOSITION TO INCINERATION

On five separate occasions, through November 17, 2021 to August 30, 2023, the City Commission considered options related to long-term solid waste disposal, including participation in Broward County's Interlocal Agreement's Second Amendment utilizing the incineration (at the site previously referenced as Wheelabrator Environmental Systems or WIN-Waste Innovations facility). On August 30, 2023, the City Commission ultimately selected an alternative disposal approach, entering into an agreement with Waste Connections of Florida for solid waste disposal services in lieu of the County's agreement for incineration. This decision was based on various reasons, including the incineration technology being used and its environmental impacts, concerns regarding increasing disposal costs, capacity limitations, potential exposure to additional transportation and tipping fees for waste diverted to alternate disposal sites, and the desire to maintain flexibility to evaluate future waste management solutions.

More importantly, on May 1, 2024, the City Commission adopted a resolution urging the Broward County Solid Waste Authority (SWA) to formally reject the use of additional incineration facilities for solid waste disposal and recycling processing within Broward County. The resolution specifically called for the SWA to confirm that it will not pursue the expansion of existing incinerators or the construction of new incineration facilities, and to explicitly prohibit such technologies within the Authority's Master Plan and Facilities

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Amendment. The resolution further encouraged the SWA to consider alternative methods of solid waste disposal and recycling processing that are environmentally responsible, sustainable, and effective.

This policy position was grounded in several years of regional planning efforts and technical studies, including the Broward County Solid Waste and Recycling Issues Study Final Report, issued by Arcadis in December 2018, that evaluated future solid waste system needs and presented three (3) cost scenarios for disposal and recycling processing. Each scenario in the report included either the addition of a fourth waste-to-energy incinerator unit at an existing facility or the construction of a new WTE incineration facility. During subsequent meetings of the Solid Waste Working Group, Broward County representatives indicated that the County had begun taking steps toward potentially procuring a new waste-to-energy facility, a position that was later confirmed in writing. One of the primary locations identified for a potential new incineration facility was reportedly property owned by Broward County in Southwest Broward County, in proximity to the City of Pembroke Pines.

In light of these developments, the City Commission expressed significant concern regarding both the potential siting of an incineration facility near the community and the broader environmental and public health implications associated with such technologies. The Commission determined that the expansion of existing incineration facilities, including waste-to-energy incinerators and any ancillary equipment, or the construction and operation of new incineration facilities is not consistent with the development of a modern, sustainable, and innovative solid waste system.

The resolution also highlighted concerns that incineration can produce air pollution and release potentially hazardous substances and emphasized that such approaches are not aligned with environmentally sustainable and forward-looking waste management practices. The City instead supports the evaluation and implementation of alternative technologies that promote resource recovery, reduce environmental impacts, and align with long-term sustainability goals.

Importantly, the City determined that the use of incineration is inconsistent with the stated Mission of the SWA, which is to develop and implement a long-term, environmentally sustainable, transparent, innovative, and economically efficient system for solid waste management. The City believes that emerging technologies, such as advanced material recovery systems, anaerobic digestion, and other non-combustion processing methods, provide more environmentally responsible and effective solutions without the risks associated with incineration.

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The City has also reaffirmed its policy to oppose and take all necessary steps to prevent the construction of any incineration facilities in Southwest Broward County, particularly in areas near the City. This position reflects both the concerns of the City Commission and the interests of residents, who have expressed strong opposition to incineration-based solutions.

The City remains committed to pursuing solid waste management strategies that prioritize environmental stewardship, public health, innovation, and long-term sustainability and will continue to advocate for non-incineration alternatives and work collaboratively with regional partners to advance solutions that align with these principles.

7.06 CURRENT STATUS OF THE SWA, MASTER PLAN AND FACILITIES AMENDMENT

Although the Solid Waste Authority (SWA) was formally established by Broward County and participating municipalities in 2023, it has remained in a developmental phase pending the adoption of the Master Plan and a Facilities Amendment, which together define the system's infrastructure, operations, funding mechanisms, and long-term disposal strategies.

On March 20, 2026, the SWA Governing Board approved the Facilities Amendment, and on **April 17, 2026**, the Governing Board approved the Master Plan. With the approval of both documents, the SWA has now established the framework necessary to advance implementation of its regional solid waste system.

As a result, on **Friday, April 17, 2026**, the SWA transmitted the approved Master Plan and Facilities Amendment, along with a draft resolution, to the municipalities advising them that they have **120 days** to adopt and deliver a resolution approving the Facilities Amendment to the SWA, no later than **Friday, August 14, 2026**.

For the Facilities Amendment to take effect, it must be approved by Broward County and municipalities representing **at least 80%** of the total population of the municipal parties currently participating in the Interlocal Agreement (ILA). **If this threshold is not met within the 120-day period, the SWA will automatically terminate.** Any municipality that fails to adopt a resolution approving the Facilities Amendment within that timeframe will be deemed to have withdrawn from the Interlocal Agreement, although such municipalities may have the opportunity to join at a later date under terms established by the Authority.

Conversely, if municipalities, representing at least 80% of the total population of the municipal parties currently in the ILA, approve the Master Plan and Facilities Amendment within the prescribed timeframe, those entities will remain/become part of the SWA under the existing long-term Interlocal Agreement for the remainder of the initial **40-year** term. Until these conditions are satisfied, the SWA cannot fully exercise key authorities, including setting rates, directing waste flow, or issuing debt.

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Accordingly, the approval and transmittal of the Master Plan and Facilities Amendment represents a critical decision point for the City in determining whether participation in the SWA aligns with its long-term solid waste management strategy.

7.07 WHAT IS THE SWA PROPOSING?

As part of its Master Plan development, the Solid Waste Authority (SWA) evaluated five (5) potential system scenarios to guide the future of solid waste management in Broward County. Based on its analysis, the SWA is recommending **Scenario A** as the preferred approach.

Scenario A is designed to achieve an estimated **62% diversion rate**, meaning that approximately 62% of waste would be diverted away from landfill disposal and waste-to-energy (WTE) facilities through a combination of recycling, organics processing, and waste reduction initiatives.

A. Proposed Programs and Services

To achieve this diversion target, Scenario A includes the implementation of several new and expanded programs:

- **Reduce Municipal Solid Waste (MSW) Collection to Once Per Week**
 - Note: The City of Pembroke Pines currently provides MSW collection twice per week
- **Restore Curbside Recycling Services Countywide**
- **Add Curbside Yard Waste (YW) Collection**
- **Introduce Food Waste (FW) Drop-Off Events**
- **Develop Permanent Drop-Off Sites for:**
 - Household Hazardous Waste (HHW)
 - Electronics Recycling
 - Additional Recycling Streams
- **Expand Waste Reduction, Reuse, and Diversion Programs**

These programs are largely focused on **behavioral changes, expanded services, and increased participation** in recycling and diversion efforts.

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B. Proposed Infrastructure and Facility Needs

To support Scenario A, the SWA identifies the need for significant new infrastructure, including:

- **Three (3) Transfer Stations** (North, Central, and South Broward County)
- **One (1) Landfill / Long-Term Disposal Solution** (640 Acres)
- **Two (2) Single-Stream Material Recovery Facilities (MRFs)** (250,000 tons per year each)
- **Two (2) Organics Processing Campuses, including:**
 - **Two (2) Mulch/Colorizing Operations** (175,000 TPY each)
 - **One (1) Biochar Pyrolysis Operation** (30,000 TPY)
- **Eight (8) Permanent Drop-Off Centers** (2,400 TPY each)
- **Two (2) Construction & Demolition (C&D) Recovery Facilities** (450,000 TPY each)

C. Disposal Strategy

While Scenario A identifies the need for a **long-term disposal solution**, including **landfill** capacity, the SWA has also indicated that **no new landfills or waste-to-energy (WTE) facilities are currently planned within Broward County.**

Based on this, it is assumed that the SWA's approach may rely on maximizing or expanding the capacity of existing landfill facilities within the County. Currently, Broward County has two primary landfill facilities:

- **Broward County Interim Contingency (BIC) Landfill** (County-owned)
- **Monarch Hill Landfill** (privately owned and operated by Waste Management)

The **BIC Landfill, located at 7101 S.W. 205 Avenue in Unincorporated Broward County near the intersection of Sheridan Street and U.S. 27.**, is a County-owned facility consisting of approximately 588 acres, with 263 acres designated within the waste boundary. While it was originally designed as a

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Class I sanitary landfill with advanced liner and environmental protection systems, it is currently operating as a Class III landfill, which accepts materials such as yard waste, construction and demolition debris, and other non-putrescible waste. **It does not currently accept Class I waste, which includes typical household garbage and other putrescible waste containing organic material.** Based on previous reporting, the BIC Landfill has a limited remaining operational life, with approximately **four (4) years remaining**, although there may be some planned expansion for additional capacity.

The **Monarch Hill Landfill, located at 2700 Wiles Road in Pompano Beach** and operated by Waste Management, has historically served as a Class I landfill for municipal solid waste. The site was nearing permitted capacity, however in August of 2025, a settlement agreement was reached allowing for the expansion of the landfill, including additional vertical and horizontal capacity. Based on recent discussions our understanding is that due to the settlement, **after 2026 this landfill may no longer be able to serve as a disposal option for Class I waste.**

While both landfills may accept **Class III waste, which consists of materials that are not expected to generate harmful leachate, such as yard waste and construction debris.** It is unclear how sufficient in-county disposal capacity for Class I waste will be maintained over the long term. This is particularly important given that all SWA scenarios identify the need for a significant long-term disposal solution, including approximately 640 acres of landfill capacity. At this time, the specific approach the SWA will take to meet this requirement has not been fully defined.

These factors introduce a level of uncertainty regarding long-term disposal strategy, cost, and system reliability that will need to be further evaluated by the City as part of its decision-making process. In the absence of clearly defined in-county disposal capacity, this may result in continued reliance on private sector infrastructure for final disposal, including potential use of waste-to-energy (WTE) incineration facilities. This is particularly relevant given prior indications that expansion of existing incineration capacity has been considered at the County level.

SWA's approach combines new infrastructure needs with reliance on existing public and private facilities. Below is a graphic of facilities in Broward County.

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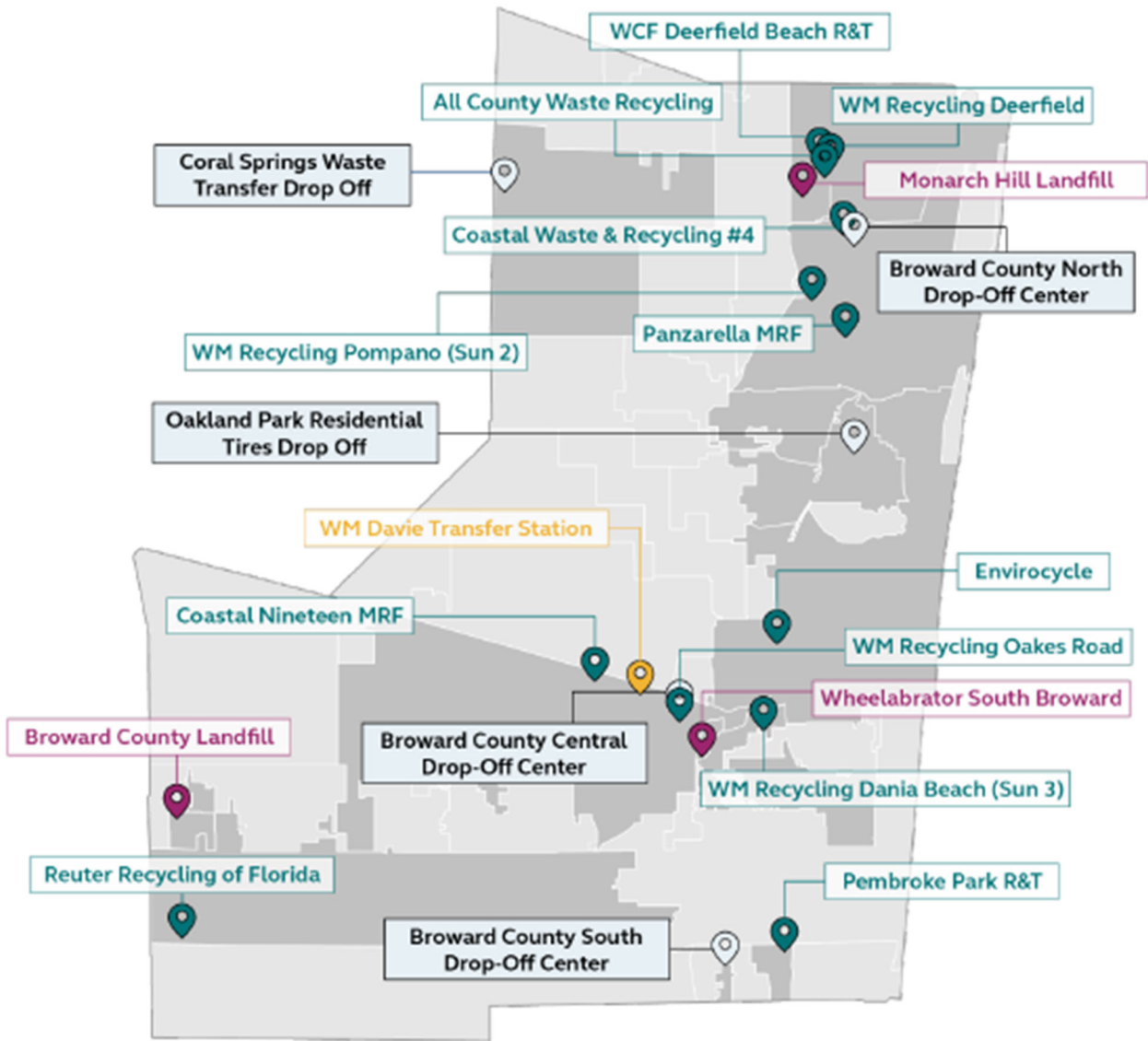


Figure 7-1 - LOCATION OF SOLID WASTE FACILITIES IN BROWARD COUNTY

(SOURCE: BROWARD COUNTY SOLID WASTE AUTHORITY (SWA), MASTER PLAN, APPENDIX F - "TASK 2 WHITE PAPER: EXISTING RESOURCES," FIGURE 37)

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D. Municipal Responsibilities: Current System vs. SWA Model

Under the current system, **cities operate independently** and **maintain direct control** over their solid waste programs, while under the **SWA model**, the system becomes **standardized and regionally coordinated**:

Current System	SWA Model
Cities set their own waste and recycling policies	Cities adopt uniform, Authority-wide policies
Cities and/or Haulers determine where waste is disposed	Waste is directed to SWA-designated facilities (flow control)
Each city has unique franchise agreements and service levels	Franchise agreements must include SWA requirements
Limited oversight of commercial and multi-family haulers	Non-exclusive commercial franchises required
Different recycling rules and material preparation standards across cities	Standardized service levels across all participating cities
Cities manage their own communications and outreach	Centralized communications and education platform
Inconsistent data reporting between jurisdictions	Standardized data reporting to the SWA
Each city maintains its own waste service budget	Integrated budgeting and long-term planning
Diversion programs are optional and vary by city	Required participation in countywide diversion programs
Results in limited economies of scale	Achieves greater economies of scale

E. Funding Mechanism

The Solid Waste Authority (SWA) has outlined a **three-phase funding approach** to support the development, implementation, and long-term operation of its regional solid waste system. This phased structure is intended to gradually transition from initial startup funding to a fully established, sustainable funding model over time.



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- **Phase 1 – Status Quo Funding (Beginning October 1, 2026)**
 - The first phase of funding maintains a structure similar to the initial formation of the SWA. Under this approach, participating municipalities will be responsible for contributing **their pro rata share of the \$2,000,000 annual operating cost, based on population.**
 - This phase is intended to support the continued development of the SWA system, including administrative operations, planning efforts, and early program implementation. Only those municipalities that elect to continue participation in the Interlocal Agreement (ILA) will be required to contribute.
- **Phase 2 - Tipping Fee Surcharge (Beginning October 1, 2027)**
 - The second phase transitions to **tipping fee surcharge**, which will be applied to all waste delivered to disposal facilities within the system. This surcharge will be collected as part of the disposal cost and remitted directly to the SWA.
 - This funding mechanism shifts the financial structure from population-based contributions to a **usage-based model**, where funding is tied to the volume of waste generated and disposed. This approach is intended to provide a more scalable and equitable funding source as the system evolves.
- **Phase 3 – Non-Ad Valorem Assessment (Beginning October 1, 2030)**
 - The third phase establishes a **non-ad valorem assessment**, which would be applied to properties as part of the annual tax bill (similar to other special assessments). This phase represents the SWA's long-term funding mechanism and is intended to provide a **stable and predictable revenue source** to support ongoing operations and capital needs.
 - It should be noted that this assessment would apply only to municipalities that elect to participate in the SWA through the Interlocal Agreement (ILA). If the City does not participate in the

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SWA, City residents and properties would not be subject to this SWA non-ad valorem assessment.

F. Purpose of Funding

The SWA has indicated that funding generated through these phases will be used to support a range of system needs, including:

- **Establishing Flow Control**
 - Ensuring that waste generated within participating municipalities is directed to SWA-designated facilities in accordance with the Interlocal Agreement
- **Capital Reserves and Future Infrastructure**
 - Building financial reserves to support future system expansion, including the potential development or expansion of facilities and addressing evolving needs over the next 40 years
- **Expansion of Programs and Services**
 - Funding new and expanded initiatives such as recycling, organics processing, and waste diversion programs
- **Education and Outreach**
 - Implementing countywide programs to encourage residents and businesses to reduce waste and increase recycling participation
- **Development of Drop-Off Infrastructure**
 - Establishing approximately **eight (8) new recycling drop-off locations** to improve accessibility and convenience for residents
- **Administrative and Operational Services**
 - Supporting the ongoing administrative functions of the SWA, including staffing, system management, and program oversight

The SWA is investing significantly in education, outreach, and behavioral change to improve recycling and diversion rates by allocating funding across

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multiple target audiences, using a mix of traditional media, digital platforms, influencers, and direct outreach to maximize engagement:

Description	Amount	Sub-Category	Amount
Direct Mail	\$90,000	Targeted areas based on contamination and recycling rates	\$90,000
General Population	\$28,000	Trust Campaign	\$12,000
		Traditional Media	\$6,000
		Facebook	\$5,000
		Instagram	\$3,000
		Influencers	\$2,000
Spanish & Creole Communities	\$14,000	Traditional Media	\$10,000
		Influencers	\$4,000
Seniors	\$12,000	Traditional Media	\$5,000
		Influencers	\$2,000
		Facebook	\$5,000
Young Adults	\$11,000	Traditional Media	\$2,000
		Instagram	\$7,000
		Influencers	\$2,000
Multi-Family Renters /	\$9,500	Traditional Media (Streaming TV)	\$4,500
		YouTube	\$5,000
Economically Challenged	\$7,500	Traditional Media (Bus ads/benches)	\$2,500
		YouTube	\$5,000
Total	\$172,000	Total	\$172,000

Building upon the City’s policy position, current system conditions, and regional considerations outlined above, the following section provides an overview of the technologies and processes under evaluation as part of the PROJECT. This section is intended to provide context for how the City may achieve its long-term waste diversion, sustainability, and resource recovery goals.

PART 8 - PROJECT TECHNOLOGY OVERVIEW

The following section provides a high-level overview of the waste processing and energy recovery technologies being considered as part of the PROJECT.

This overview is intended to help explain how these technologies function, how they differ from traditional waste disposal methods such as landfilling and incineration, and how they may support the City's goals of increasing waste diversion, reducing environmental impacts, and generating renewable energy from waste streams.

The discussion focuses on non-combustion-based processes, with particular emphasis on anaerobic digestion and complementary technologies that can be integrated into a comprehensive waste management system.

8.01 WHAT TECHNOLOGIES CAN ACHIEVE THESE GOALS?

Upon review of available technologies for the conversion of MSW to renewable sources of energy (Energy Recovery) without the use of any burning process (combustion), the options are limited. In order to rule out the available options, we first need to identify those options which are not acceptable. The EPA defines Energy Recovery from waste as the conversion of non-recyclable waste materials into useable heat, electricity, or fuel through a variety of processes, including combustion, gasification, pyrolysis, anaerobic digestion, and landfill gas (LFG) recovery. (Source - [HTTPS://WWW.EPA.GOV/SMM/SUSTAINABLE-MATERIALS-MANAGEMENT-NON-HAZARDOUS-MATERIALS-AND-WASTE-MANAGEMENT-HIERARCHY](https://www.epa.gov/smm/sustainable-materials-management-non-hazardous-materials-and-waste-management-hierarchy)) *For the purposes of this discussion the term "Waste-to-Energy" will refer to those technologies that utilize combustion processes, while "Energy Recovery" will refer to those technologies that generate energy without the use combustion.* The following is a list of technologies which are currently available and their mode of operation:

1. Waste-to-Energy Technologies (Combustion Processes)

- a. **Incineration** – A form of Waste-to-Energy in which garbage is burned to produce electricity.
- b. **Gasification** - A form of Waste-to-Energy in which garbage is burned to produce fuel gases.

2. Energy Recovery Technologies (Non-Combustion Processes)

- a. **Landfill Gas Recovery** – A form of Energy Recovery which captures fuel gas as produced by decaying garbage in a landfill.
- b. **Pyrolysis** – A form of Energy Recovery which heats some forms of garbage to produce fuel oil, fuel gas and bio-char.

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- c. **Anaerobic Digestion** - A form of Energy Recovery in which microorganisms break down some forms of garbage to produce fuel gas and solid fuel.

Combustion and Gasification are not applicable for reasons previously stated. While Landfill Gas Recovery is practiced in Florida, it does not align with the City's long-term goals for waste diversion and resource recovery. Although other technologies, not yet named by the EPA are emerging, the most established non-combustion approaches remain Pyrolysis and Anaerobic Digestion. Anaerobic digestion is a natural process in which microorganisms break down organic matter in the absence of air/oxygen (an anaerobic environment), producing usable products such as biogas and digested material (digestate).

Based on current evaluations, it is unlikely that any single technology would independently meet the City's goals. Instead, a combination of complementary technologies, an approach which is increasingly being implemented around the globe, offers a more effective solution. In these models, anaerobic digestion serves as the primary process, while pyrolysis or other emerging technologies may function as pre-treatment methods to enhance the overall system efficiency and effectiveness to maximize the production of recoverable energy.

8.02 DOES ANAEROBIC DIGESTION WORK?

Anaerobic Digestion (AD) has been a reliable source of waste treatment for a long time. It was known in 17th Century that flammable gases could come from decaying organic matter. The first digestion plant was constructed in India in 1859 and England in 1895 where Renewable Natural Gas (RNG) was used to fuel street lights. The most common applications today include wastewater treatment of biosolids and agricultural-based installations due to large quantities of organic matter. One of the most dramatic examples of successful large-scale anaerobic digestion facilities has been Denmark, where over 100 large, centralized plants are now in operation. In many cases, these facilities co-digest manure, clean organic industrial wastes, and source-separated municipal solid waste (MSW).

Denmark's commitment to AD has resulted in consistent incentives and rules that encourage biogas production. While the initial focus was on electricity from biogas, the industry has shifted to producing "Renewable Natural Gas" that is pumped into the nation's natural gas pipeline grid. As of 2026, over 40% of the nation's natural gas use comes from biogas.

(Source - [HTTPS://EXTENSION.PSU.EDU/A-SHORT-HISTORY-OF-ANAEROBIC-DIGESTION](https://extension.psu.edu/a-short-history-of-anaerobic-digestion)).

Over the years, AD technology has advanced significantly and has become more efficient. Modern systems are commonly referred to as continuous High Solids Anaerobic Digestion

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(cHSAD). These advancements, combined with the integration of a pre-treatment processes, represent the current state of the art for Energy Recovery through AD.

According to the Broward County SWA, when evaluating the addition the organic fraction of municipal solid waste (MSW) to anaerobic digesters, they have stated “Co-digestion of food waste at WWTPs is a widely adopted food waste diversion method that has been extensively studied and implemented globally. This approach is both practical and cost-effective[...].” (Source: Broward County Solid Waste Authority (SWA), Master Plan, Appendix I – “Task 4 White Paper: Future Needs Assessment,” Appendix C)

It should be noted that MSW must be sorted prior to processing through AD systems. Some approaches rely on source separation, where residents separate materials. Others approaches utilize advanced onsite separation technologies, similar to Waste Management’s new Recycling Facility in Pembroke Pines, which employs state of the art optical sorting and artificial intelligence (AI) systems to separate recyclables. Once separated, the remaining organic fraction of the waste stream is suitable for processing through AD.

When multiples organic waste streams, such as MSW, commercial waste, yard waste, biosolids and the like, are processed together, the process is referred to as “Co-Digestion”.

The proposed PROJECT model is based on this Co-Digestion approach, combining the organic fraction of MSW, after removal of recyclables, with additional available feedstocks, such as yard waste and biosolids, to produce Renewable Natural Gas (RNG) and solid fuel to achieve approximately 70% or more landfill diversion while creating Renewable Energy.

The following is a short list of AD installations:

LOCATION	INSTALL DATE	PROCESS	CAPACITY	SOLID (DIGESTATE) USE	GAS USE
Frankfort, Germany	2018	Separated MSW to AD*	22,000 TPY	Compost/Fertilizer	RNG to grid
Aprilia, Italy	2021	Separated MSW to AD*	87,000 TPY	Compost	RNG to electricity
Augsburg, Denmark	2016	Separated MSW to AD*	90,000 TPY	Compost/Fertilizer	RNG to grid
Cordele, Crisp Co, GA, USA	2025	Separated MSW to Burcell/AD*	100,000 TPY	Solid Fuel Contracts for Cement MFG	RNG to grid- Under Construction

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Fulton, GA, USA	2027 Permitted	Separated MSW to Burcell/AD*	187,000 planned	Solid Fuel contracts pending	RNG to grid- Under Construction
Ulster Co, NY, USA	2026 - Awarded Only	Separated MSW to Pyrolysis/AD*	150,000 TPY	Digestate to landfill top cover	RNG to gas grid
Madrid, Spain	2020	Source Separated pyrolysis	70,000 TPY	Digestate to landfill	RNG to electricity

8.03 OBSERVATIONS ABOUT ANAEROBIC DIGESTION

1. It is clear that AD is a viable means of treatment of MSW from a technical standpoint. There are more than enough examples of successfully operating facilities and many more could be documented. However, it should be noted that the size or scale of the City’s vision is greater than other installations currently in operation. While there are two agencies already proceeding with facilities of similar scale, Ulster County, NY and Fulton County, GA, these facilities are not yet in operation. Hence, caution, contingencies and allowances are in order as the City contemplates this, or other, state of the art solutions.
2. It is also clear and intuitive that the financial success of any solution greatly depends on the return on investment provided by the marketable products. It will be necessary to secure long-term contracts for the sale of RNG and solid fuel for the solution to be financially viable. Consideration should be given to the contract requirements of the design-build-operate agreement of the successful bidder such that the City is not responsible for end-user contracts.
3. Since AD involves the production of RNG, which largely consists of methane, the process must be carefully designed with the appropriate safety facilities. When properly designed, constructed and operated, AD installations are safe and effective.
4. Please refer to Appendix A - Anaerobic Digestion Fact Sheet provided by the United States Environmental Protection Agency (US EPA) for questions and answers regarding AD.

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8.04 A WORD ABOUT PFAS

It is well known that the EPA has established new drinking water regulations for per- and polyfluoroalkyl substances (PFAS). It is also expected that PFAS may be present in municipal solid waste (MSW) and wastewater biosolids.

The PROJECT model includes the production of a stabilized byproduct (digestate) that can be further processed into a solid fuel. This material would not be utilized on-site, but rather marketed and transported to permitted third-party facilities that are specifically designed to utilize such fuels in their operations for energy.

At these end-use facilities, the solid fuel is typically subjected to high-temperature thermal processes as part of industrial applications (e.g., cement kilns or similar facilities), which can result in the destruction of PFAS compounds. The EPA has identified thermal treatment at sufficiently high temperatures as an effective method for the destruction of PFAS. (Source - [HTTPS://WWW.EPA.GOV/PFAS/INTERIM-GUIDANCE-DESTRUCTION-AND-DISPOSAL-PFAS-AND-MATERIALS-CONTAINING-PFAS](https://www.epa.gov/pfas/interim-guidance-destruction-and-disposal-pfas-and-materials-containing-pfas)-[HTTPS://WWW.EPA.GOV/PFAS/INTERIM-GUIDANCE-DESTRUCTION-AND-DISPOSAL-PFAS-AND-MATERIALS-CONTAINING-PFAS](https://www.epa.gov/pfas/interim-guidance-destruction-and-disposal-pfas-and-materials-containing-pfas)).

As a result, the selected Design-Build Firm will be required to identify and confirm appropriate end-use facilities and demonstrate that the anticipated thermal processes used by those facilities are capable of effectively managing and destroying PFAS.

This approach represents a beneficial reuse of materials that might otherwise require disposal, while ensuring that downstream handling is conducted in a manner consistent with regulatory guidance and environmental best practices. Additionally, the use of this solid fuel as a supplemental energy source at permitted industrial facilities can reduce reliance on conventional fossil fuels, such as coal, or other less sustainable materials traditionally used in these processes, further supporting broader environmental and sustainability objectives.

8.05 NATIONAL TRENDS OF LANDFILL DIVERSION AND ANAEROBIC DIGESTION

The City's Strategic Plan's goals of promoting renewable energy and exploring alternative sustainable waste treatment options along with the City's Green Plan, which emphasizes waste reduction, renewable energy generation, carbon reduction, and sustainable resource management is well aligned with national trends in the legislation of other states. A few of many examples include the following:

1. California SB1383 - A statewide mandate requiring residents and businesses to separate organic waste (food scraps, green waste) from trash to reduce methane emissions. Effective January 1, 2022, it's goal was to cut landfill organic waste by 75% by 2025.

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2. Vermont Act 148 – As of July 1, 2020, Vermont state law banned disposal of food scraps to landfills to reduce greenhouse gas emissions, save resources and increase food donation.
3. Connecticut CGS 22s-226e – A law requiring large commercial generators to reduce food waste through efficiency improvements, donation of surplus food, or diversion of food waste to composting, anaerobic digestion, or other organics processing facilities.

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PART 9 - CONCLUSION AND RECOMMENDED ACTIONS

The City of Pembroke Pines is at a critical decision point in shaping the future of its solid waste management system. As outlined in this White Paper, the City is currently operating within a framework that relies heavily on external disposal facilities, long-haul transportation, and market-dependent recycling conditions, all of which present long-term cost, environmental, and operational uncertainties.

At the same time, Broward County's Solid Waste Authority (SWA) has advanced a regional framework that introduces standardized policies, flow control, and long-term commitments, while still leaving key questions regarding cost certainty, facility locations, disposal methods, and impacts to existing local service structures unresolved.

In parallel, the City has identified an opportunity to pursue a locally controlled solution through the development of the PROJECT, which is designed to:

- Increase diversion of waste from landfills
- Recover recyclable materials from mixed waste streams
- Process organic waste and biosolids
- Generate renewable energy without reliance on incineration
- Provide long-term system flexibility and scalability

Importantly, these approaches are not mutually exclusive. The City may continue evaluating participation in the SWA while simultaneously advancing the PROJECT to preserve flexibility, maintain local control, and strengthen its long-term negotiating position.

However, delaying action on the PROJECT could result in the City becoming increasingly dependent on external systems, with limited ability to influence cost structures, disposal methods, or environmental outcomes.

9.01 KEY CONSIDERATIONS

In evaluating its path forward, the City Commission should consider the following:

- **Control vs. Regional Standardization:** Participation in the SWA would shift decision-making authority toward a regional body, including control over waste flow, policies, and system operations.
- **Long-Term Commitment:** Joining the SWA represents a long-term commitment of approximately forty (40) years, extending through approximately 2063.

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- **Cost Uncertainty:** While the SWA proposes a phased funding mechanism, long-term costs associated with infrastructure, disposal, and system expansion remain uncertain.
- **Environmental Policy Alignment:** The City has clearly established its policy opposition to incineration and its preference for non-combustion, sustainable waste management technologies.
- **System Flexibility:** Advancing the PROJECT allows the City to retain flexibility, adapt to emerging technologies, and respond to changing regulatory and market conditions.

9.02 RECOMMENDED ACTIONS

Based on the information presented in this White Paper, City staff recommends that the City Commission:

1. Authorize Advancement of the PROJECT

- a. Direct staff to proceed with the issuance of a Request for Qualifications (RFQ) for the PROJECT, including development of a Design Criteria Package to further evaluate technology, feasibility, and cost.

2. Continue Evaluation of SWA Participation

- a. Support continued evaluation of SWA participation and the Master Plan and Facilities Amendment, including financial, operational, governance, and policy implications.
- b. Support active participation in regional discussions with Broward County and the SWA to advocate for the City's policy priorities, including opposition to incineration and support for sustainable, non-combustion technologies.

3. Preserve Strategic Flexibility

- a. Support exploration of interim recycling strategies utilizing the Waste Management facility while maintaining the City's ability to pursue multiple parallel strategies, including local infrastructure development, private sector partnerships, and potential regional collaboration, without committing prematurely to any single approach.

9.03 CLOSING STATEMENT

By advancing the PROJECT while continuing to evaluate regional participation, the City of Pembroke Pines can position itself to make a fully informed, strategic decision that balances cost, environmental responsibility, operational control, and long-term sustainability.

This approach ensures that the City remains proactive rather than reactive, and preserves its ability to deliver a resilient, innovative, and environmentally responsible solid waste management system for its residents.

Appendix A - Anaerobic Digestion Fact Sheet



Biogas Storage at Anaerobic Digestion Plant, Frankfurt, Germany

(Energy Recovery from Municipal Solid Waste utilizing Anaerobic Digestion for the production of biogas and digestate fuel source.)

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(Source: US Environmental Protection Agency [HTTPS://WWW.EPA.GOV/ANAEROBIC-DIGESTION/FREQUENT-QUESTIONS-ABOUT-ANAEROBIC-DIGESTION](https://www.epa.gov/anaerobic-digestion/frequent-questions-about-anaerobic-digestion))

- **What is anaerobic digestion?**

Anaerobic digestion is the natural process in which microorganisms break down organic matter in the absence of air (an anaerobic environment). Anaerobic digestion creates usable products such as biogas and digested material.

- **What is an anaerobic digester?**

Anaerobic digesters are built systems (lagoons or tanks) where anaerobic digestion takes place. Anaerobic digesters **manage organic wastes**, produce gas and digested materials, minimize odors, reduce pathogens, and reduce solid wastes. Anaerobic digesters are also called “anaerobic digestion systems”, “biodigesters” or simply “digesters”.

- **What is co-digestion?**

Co-digestion happens when more than one type of organic material is digested at the same time. Digesters are often built for a single purpose. For example, a farmer may build an anaerobic digester to handle cow manure. If the farmer also takes food waste from a local grocery store and puts the food waste in the digester along with the cow manure, it is called co-digestion.

- **What is biogas?**

Biogas is the gas produced when bacteria break down organic matter in the absence of oxygen. It is made up of mainly methane (CH₄) and carbon dioxide (CO₂), with small amounts of water vapor, particulates, and other gasses, such as hydrogen sulfide (H₂S). Biogas can be processed and used for a variety of energy needs, such as the generation of heat, power and fuel.

- **How is biogas generated?**

Inside an anaerobic digester, naturally occurring microorganisms grow in the tank’s oxygen-free environment and break down (digest) the organic matter. As the organic matter decomposes, biogas is created. Once established in a digester, microorganisms will continue to break down organic materials and release biogas in the right conditions. The microorganisms need a steady supply of feedstock and a comfortable environment - warm temperatures, neutral acidity and no oxygen.

- **What is digested material and what is it used for?**

Digested material is the solid and liquid material that remains at the end of the anaerobic digestion process. Digested material contains valuable nutrients (nitrogen, phosphorus and potassium) and organic carbon. Typically, raw digested material is processed into a wide variety of products like fertilizer, compost, soil amendments or animal bedding. Factors influencing what products are made include the makeup of the initial feedstocks and local markets. These co-products can be sold to agricultural, commercial and residential customers.

- **What types of organic materials produce biogas?**

Many types of organic material can be used as feedstock to produce biogas. Animal manures, wastewater solids, food scraps, restaurant fats, oils, and greases, and by-products from food and beverage production are some commonly digested materials. An anaerobic digester may be built for a single material or a combination of them. However, the feedstocks must be properly controlled to ensure that the system remains healthy and functioning.

- **Is biogas a renewable energy source?**

Yes, biogas is a renewable energy source. It is produced from natural resources that are replenished in short periods of time.

- **Can biogas replace fossil fuels?**

Yes, biogas can replace fossil fuels for the production of heat, power and fuel. With additional processing, biogas becomes renewable natural gas that can be used in the same place as fossil fuels.

- **How does biogas help reduce effects of climate change?**

Biogas is made up of methane and carbon dioxide, which are powerful greenhouse gases. Anaerobic digesters are designed to capture these gases so they do not escape to the atmosphere. In most cases, the feedstocks used in digesters would have released methane directly as they decomposed in lagoons or landfills. In addition, using biogas for heat or electricity means that less energy needs to be produced by power plants. This reduces the amount of carbon dioxide emitted to the atmosphere by burning fossil fuels.

- **What types of facilities have anaerobic digesters?**

Recycling and Sustainable Energy Recovery Solution

Anaerobic digesters are usually built on sites that have a steady supply of organic materials and need energy or heat. Common examples include farms, water resource recovery facilities, food production facilities, and landfills. Also, stand-alone digesters can be built in a central location to accept organics from multiple businesses.

- **Is there a difference between landfill gas and biogas?**

Landfill gas is a type of biogas. Both can be converted to renewable energy (electricity or fuel).

- **Is there a difference between natural gas and biogas?**

Biogas and natural gas have essentially the same components. But, the two gasses are obtained in different ways.

Biogas is produced when readily available organic materials (e.g., manure or food waste) break down. Natural gas is produced when ancient plants, tiny sea animals, and other organic materials break down in hard to access locations. Usually, natural gas has to be extracted from underground reservoirs. Natural gas can also be derived from petroleum refining.

- **If I build a biogas system will it stink?**

Biogas contains a small amount of hydrogen sulfide, which has a rotten-egg odor. However, anaerobic digesters are completely enclosed and biogas is not released directly to the air. Digesters are commonly installed at farms to reduce odors. What comes out of a digester after processing is much less odorous than the feedstocks that go into digesters.

- **Are anaerobic digesters safe?**

A properly designed and operated system is very safe. Anaerobic digesters are designed to meet local and national codes for safety. However, they do produce methane and hydrogen sulfide. These gases both burn easily and are harmful to inhale, so it is essential to use proper gas-handling precautions. It is also important for plant operators to be well trained and follow established operational procedures.

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(taken from email correspondence with USEPA-see below)

- **Does Anaerobic Digestion create “ASH” pollution like traditional waste-to-energy combustion facilities?**

No. “EPA does not consider anaerobic digestion as a combustion process...”.

From: [Fabiano, Claudia](#)
To: [Cooper, Jonathan](#)
Cc: [US EPA Resource Recovery](#); [Sjogren, Mya](#)
Subject: RE: Q on anaerobic digestion: when used in Energy Recovery from Municipal Solid Waste, is not a combustion process?
Date: Wednesday, March 11, 2026 4:20:36 PM
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)
[image004.png](#)
[image005.png](#)

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Hi Jonathan,

I can confirm that EPA does not view anaerobic digestion as a combustion process. I can understand why the title of this [webpage](#), followed by the sentence directly under it, could cause some confusion, but it was not meant to imply that AD is a combustion process. It is intended to convey that energy recovery from waste can stem from various processes, including AD and combustion. Then the page goes on to focus only on combustion. We will make some clarifying edits to avoid any further confusion.

Thank you,
Claudia

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Resource Recovery Division
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